
PROPULSION DIRECTORATE



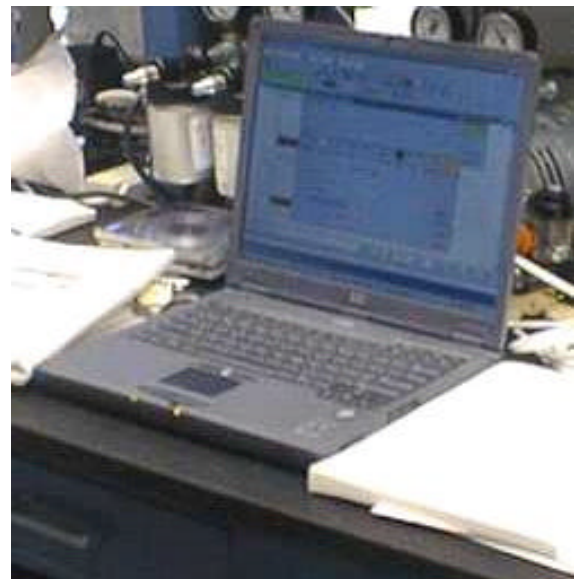
Monthly Accomplishment Report August 2003

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SPEEDY ANALYZER ENSURES SAFE USE OF JET FUELS: The Propulsion Directorate's Fuels Branch (AFRL/PRTG) has developed a new capability to rapidly analyze jet fuels in a mobile laboratory setting. The fast gas chromatograph (GC) is an instrument that quickly creates an accurate "fingerprint" of the fuel that can be used in the determination of bulk properties such as freeze point, flash point, sulfur content, and distillation range. This information can be used to identify "off-specification" fuels giving the warfighter a timely assessment of their suitability for use. This is critical for overseas operations where fuels may be obtained from a variety of sources and the type and quality of the fuel is a concern. PR developed the fast GC in conjunction with the University of Dayton Research Institute with the objective of creating a fast response field deployable GC. While a typical GC takes 1 to 2 hours to run, the fast GC can obtain specification estimates in only 5 minutes, and it eliminates the need to transport fuel samples to a laboratory for analysis. In addition, the fast GC is relatively inexpensive. This valuable analytical tool went from the drawing board to a functioning unit in less than a year, and it is expected to be fielded in the very near future to help keep US aircraft and other systems operating safely and efficiently. (W. Harrison, AFRL/PRTG, (937) 255-6601)

Want more information?

- ❖ A more detailed story on the fast GC is available on the Air Force Link website by clicking [here](#).



The Fast Gas Chromatograph

PONNAPPAN NAMED FELLOW OF ASME

INTERNATIONAL: The Propulsion Directorate's Dr. Rengasamy "Pon" Ponnappan was recently named a Fellow of the American Society of Mechanical Engineers (ASME) International. The Fellow grade is the highest elected grade of membership within ASME, and the attainment of this grade recognizes exceptional engineering achievements and contributions to the engineering profession. Dr. Ponnappan was recognized for his significant contributions in the area of thermal management technologies over the past 25 years. He pioneered research on the high-speed rotating heat pipe, co-invented the concept of the double-wall artery wick, explored gas-loaded liquid metal heat pipe start-up, and developed facilities for testing heat pipes in a high "g" centrifuge. He is the author of five US patents and over 100 research publications, and his "Rotor Cooling Structure" patent ([US Patent No. 5,283,488](#)) has been licensed by an aircraft alternator manufacturer for improving bearing life and reliability. Dr. Ponnappan is also an Associate Fellow of the American Institute of Aeronautics and



Dr. Rengasamy "Pon" Ponnappan was recently named a Fellow of ASME International

Astronautics (AIAA) and he is the Past Chair of the Dayton Section of ASME. (J. Erbacher, AFRL/PRPS, (937) 255-2372)

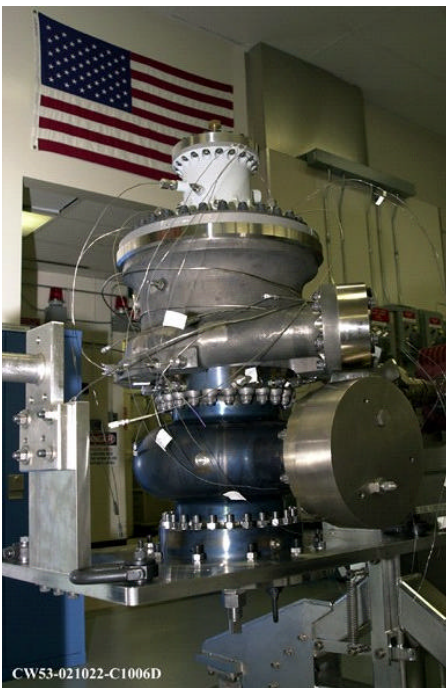
Want more information?

- ❖ More information on the new ASME International Fellows for 2003 can be found [here](#).

HYDROGEN TURBOPUMP TESTING

UNDERWAY: The Propulsion Directorate initiated cold flow testing of the Integrated Powerhead Demonstration (IPD) Program's liquid hydrogen turbopump on 4 August 2003. This testing is being conducted at NASA Stennis Space Center in Mississippi. The turbopump being tested is one of two Boeing/Rocketdyne turbopumps being developed for the Integrated High Payoff Rocket Propulsion Technology (IHPRT) Phase I Cryoboost Demonstrator rocket engine. The other pump, a liquid oxygen

turbopump, completed hot fire testing in June 2003. Initial tests of the hydrogen turbopump were completed with no anomalies, successfully laying the ground work for future engine testing. This test is part of the validation of an innovative turbopump bearing design that provides an order of magnitude improvement in life and reliability over



The Integrated Powerhead Demonstration liquid hydrogen turbopump



Integrated Powerhead Demonstration liquid hydrogen turbopump test at the NASA Stennis Space Center E1 Test

current capabilities. Cold flow testing of the liquid hydrogen is scheduled to be completed by the end of October 2003. (J. Thornburg, AFRL/PRSE, (661) 275-5320)

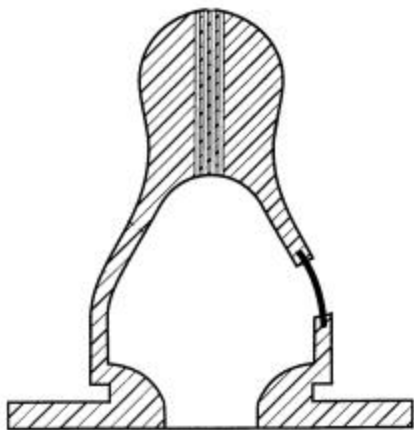


Mr. Parker Buckley was named the AFA Wright Memorial Chapter Civilian Executive of the Year for 2003

BUCKLEY HONORED BY AIR FORCE ASSOCIATION: The Propulsion Directorate's Mr. Parker L. Buckley was recently honored by the Air Force Association (AFA). Mr. Buckley was named the AFA Wright Memorial Chapter Civilian Executive of the Year for 2003. He was presented with this award at the 2003 Air Force Anniversary Ball held on 4 September 2003 at the Air Force Museum. This award recognizes Mr. Buckley's outstanding leadership as the Chief of PR's Aerospace Propulsion Division (AFRL/PRA). Mr. Buckley has effectively led AFRL/PRA in its mission to develop high speed engines, such as ramjets, scramjets, and various combined cycle engines that operate over a very broad flight regime. Such engines are an enabling technology for high speed missiles, military space operations missions, and high speed global reach missions. (Col M. Heil, AFRL/PR, (937) 255-2520)

MICROTUBE TECHNOLOGY FINDS UNIQUE APPLICATION: Propulsion Directorate researchers working in the area of microtube technology were recently granted a US Patent of a unique nature. Dr.

Wesley Hoffman and Dr. Phil Wapner* of PR's High Temperature Component Group at Edwards AFB, California, and Dr. Alex Pechenik, formerly of AFOSR, were granted [US Patent No. 6,588,613](#) titled "Baby-Feeding Nipple." This patent imitates more closely the function of the human breast utilizing microtube technology. This is the first patent that departs from the usual hollow elastomeric shell design,



Schematic of the patented device



Fluid delivery capillary

* Dr. Wapner is an on-site contractor with PR's Space and Missile Propulsion Division.

and this new concept is so revolutionary that the patent was allowed by the US Patent office in only 8 months with no changes. Drs. Hoffman and Wapner hold several other patents on microtube technology where it has wide ranging applications in the aerospace, automotive, and medical industries. (W. Hoffman, AFRL/PRSM, (661) 275-5768)

LAMM IS CO-WINNER OF SAE'S MANLY MEDAL: The Propulsion Directorate's Mr. Peter T. Lamm was named a co-winner of the 2002 Charles M. Manly Memorial Medal presented by the Society of Automotive Engineers (SAE). Originally established in 1928, the Manly Medal is awarded to the author of the best paper presented at an SAE meeting relating to the theory or practice in the design or construction of, or research on, aerospace engines, their parts, components, or accessories. The award considers the value of the author's contribution to the state of the art in the furtherance of engine technology. Mr. Lamm won this award together with Scott D. Sudhoff and Calumet B. P. Loop of Purdue University for their paper titled, "Analysis and Simulation of a UAV Power System."[†] Mr. Lamm was presented with the Manly Medal on 10 September 2003 at the SAE Aerospace Congress & Exhibition in Montreal, Canada. (J. Weimer, AFRL/PRPE, (937) 255-6236)



Mr. Peter T. Lamm was a co-winner of SAE's Manly Medal

PULSED DETONATION ENGINE TAKES SUMMER ROAD TRIP: This summer, the Propulsion Directorate's Pulsed Detonation Engine (PDE) hit the road to be displayed at a few high-profile venues. The display consisted of the PDE mounted to a Long EZ airframe, a combination that is scheduled to make its first flight this fall. The Long EZ airframe is a product of Burt Rutan's Scaled Composites of Mojave, California. The novel aircraft, with its unique propulsion system, was displayed at: the AIAA/ICAS[‡] International Air & Space Symposium and Exposition in Dayton, Ohio; the Dayton Air Show, also held in Dayton; and the Experimental Aircraft Association's (EAA) AirVenture 2003 held in Oshkosh, Wisconsin. Everywhere it was displayed, the PDE/Long EZ combo was greeted with curiosity, awe, and enthusiasm. The current flightworthy PDE utilizes AFRL's innovative design approach, using off-the-shelf automotive parts for the engine. It is capable of operating on general-aircraft fuel or even regular unleaded auto gas. Though the current PDE/Long EZ configuration is to fly subsonically, it is envisioned that PDEs could eventually provide power for aircraft operating at speeds as high as Mach 4. (F. Schauer and J. Stutrud, AFRL/PRTS, (937) 255-6462)

[†] Scott D. Sudhoff, Calumet B. P. Loop, and Peter T. Lamm, "Analysis and Simulation of a UAV Power System," SAE Power Systems Conference, October 2002, SAE Paper 2002-01-3175.

[‡] AIAA = American Institute of Aeronautics and Astronautics; ICAS = International Council of the Aeronautical Sciences.

Want more information?

- ❖ A detailed story on the PDE's trip to EAA AirVenture 2003 is available on the Air Force Link website by clicking [here](#).
- ❖ More information on the AIAA/ICAS conference can be found [here](#).
- ❖ More information on EAA AirVenture 2003 can be found [here](#).



Dr. Fred Schauer discusses the PDE with a visitor at AirVenture 2003.



Some of the 800,000 visitors at AirVenture 2003 in Oshkosh, Wisconsin examine the Pulsed Detonation Powered LongEZ displayed by AFRL. Mr. Jeff Stutrud (blue hat on left) and other blue shirted AFRL representatives answered thousands of questions each day.

PEARCE ENCOURAGES WOMEN TO PURSUE
ENGINEERING CAREERS:

The Propulsion Directorate's Ms. Patricia Pearce delivered the keynote address at the "Dinner with an Engineer" portion of the University of Dayton's Women in Engineering (WIE) Summer Camp. The WIE Summer Camp is a week-long program offering high school girls the opportunity to explore engineering career fields and experience college life. This year marked the 30th WIE Summer Camp, and over the past 30 years, thousands of girls from all over the nation have participated in the program. The "Dinner with an Engineer" portion of the program gives the participants a chance to meet one-on-one with practicing women engineers. This year, the 74 participants in the program were joined by about 60 practicing female engineers for the dinner. Ms. Pearce, a program manager in PR's Aerospace Propulsion Division (AFRL/PRA), conveyed her experiences over more than 20 years of service as a female engineer for the Air Force, and her talk was warmly received. The dinner was held on the University of Dayton campus on 16 July 2003. (A. Boudreau, AFRL/PRAT, (937) 255-1237)



Ms. Patricia Pearce gave the keynote address at the University of Dayton's Women in Engineering (WIE) Summer Camp "Dinner with an Engineer."

Want more information?

- ❖ More information on the Women in Engineering Summer Camp is available [here](#).